CLAIMS

What is claimed is:

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process for forming a tube clamp comprising the steps of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then

removing said cured material from said layup tooling while retaining the shape of said layup tooling without exposing fibers.

- 2. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of unidirectionally oriented fibers in a polymer resin matrix, and the step of removing said cured material further includes removing said cured material while maintaining the fibers along the contour of the layup tooling as continuous.
- 3. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of woven fibers in a polymer resin matrix, and the step of removing said cured material further includes removing said cured material while maintaining the fibers along the contour of the layup tooling as continuous.
- 4. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of randomly oriented fibers in a polymer resin matrix.
- 5. The process of claim 1 wherein the curable matrix is a polyimide resin matrix and the fibers are carbon fibers.
- 6. The process of claim1 wherein the step of layering a plurality of sheets includes layering a first plurality of sheets to a predetermined thickness to form a bottom ply layer, layering a second plurality of sheets to a predetermined thickness to form a top ply layer and sandwiching filler material between the top ply layer and the bottom ply layer.

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- The process of claim 6 wherein the filler material includes a plurality of plies cut to a predetermined shape to fill a region between the bottom ply layer and the top bly layer.
- 8. The process of claim 6 wherein step of layering a plurality of sheets to form a top ply layer and a bottom ply layer includes layering sheets of random fiber mat.
- 9. The process of claim 1 wherein the step of curing includes autoclaving said material at a predetermined temperature and pressure.
- 10. The process of claim 1 wherein the step of curing includes processing in a match metal press having a movable upper platen at a predetermined temperature and pressure.

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N. The process of claim 1 wherein the step of curing includes resin transfer molding.

2. A process for forming a tube clamp comprising the steps of:

layering a first plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of a first layup tooling having a first predetermined shape;

layering a second plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of second layup tooling having a second predetermined shape, the first predetermined shape and second predetermined shape having mating interfaces;

curing said first plurality of sheets of curable material and second plurality of sheets of curable material to net shape;

removing the cured material from said first and second layup tooling while retaining the contour of said toolings having predetermined shapes without exposing fibers; and

making said cured material from said first and second layup tooling along the mating interfaces.

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abe clamp made by the process of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then
removing said cured material from said layup tooling while retaining
the shape of said layup tooling without exposing fibers.

14. A tube clamp made by the process of:

layering a first plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of a first layup tooling having a first predetermined shape;

layering a second plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of second tayup tooling having a second predetermined shape, the first predetermined shape and second predetermined shape having mating interfaces;

curing said first plurality of sheets of curable material and second plurality of sheets of curable material;

removing the cured material from said first and second layup tooling while retaining the contour of said toolings having predetermined shapes without exposing fibers.; and

mating said cured material from said first and second layup tooling along the mating interfaces.

15. A tube clamp made by the process of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then

removing said cured material from said layup tooling while retaining the shape of said layup tooling without exposing fibers;

trimming the edges of said cured layering material; and

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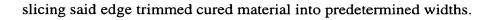
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PXBXt

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- 16. The tube clamp of claim 15 wherein the curable material is fibers in a polymer resin matrix.
- 17. The tube clamp of claim 16 wherein the polymer matrix is a polyimide resin and the fibers are carbon fibers.
- 18. The tube clamp of claim 16 wherein a plurality of sheets are layered into a first plurality of sheets of a predetermined thickness to form a bottom ply layer and second plurality of sheets to a predetermined thickness to form a top ply layer, and a filler material is sandwiched between the top ply layer and the bottom ply layer.
- 19. The tube clamp of claim 18 wherein the filler material includes a plurality of plies cut to a predetermined shape to fill a region between the bottom ply layer and the top ply layer.
- 20. The tube claim of claim 18 wherein the top ply layer and the bottom ply layer are formed from a plurality of sheets of random fiber mat.
- 21. The process of claim 19 wherein the filler material includes a plurality of plies of oriented fiber cut to a predetermined shape to fill a region between the bottom ply layer and the top ply layer.
- 22. The tube clamp of claim 16 wherein the curable material is cured by autoclaving at a predetermined emperature and pressure.
- 23. The tube clamp of claim 16 wherein the curable material is cured in a match metal press.
 - 24. The tube clamp of claim 16 wherein the curable material is cured by resin transfer molding.
 - 25. A tube clamp for use in a hot section of a gas turbine engine, comprising:
 - a first half of cured composite material, the first half having a first portion including continuous fibers embedded in a matrix, the first portion

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being of a predetermined thickness to form a bottom ply layer and having a predetermined contour conforming to at least a portion of a tube and an interface, a second portion having continuous fibers embedded in a matrix, the second portion being of a predetermined thickness to form a top ply layer, and a filler material sandwiched between the top ply layer and the bottom ply layer, the first half having no exposed fibers;

a second half of cured composite material, the second half having a first portion including continuous fibers embedded in a matrix, the first portion being of a predetermined thickness to form a bottom ply layer and having a predetermined contour conforming to at least a portion of a tube and an interface corresponding to the interface of the first half, a second portion having continuous fibers embedded in a matrix, the second portion being of a predetermined thickness to form a top ply layer, and a filler material sandwiched between the top ply layer and the bottom ply layer, the second half having no exposed fibers; and

means for joining the first half to the second half.

- 26. The tube clamp of claim 25 wherein the matrix is a polyimide resin.
- 27. The tube clamp of claim 25 wherein the fibers are carbon fibers.
- 28. The tube clamb of claim 25 wherein the filler material is formed from random mat fiber.
- 29. The tube clamp of claim 25 wherein the filler material is formed from prepreg sheet having oriented fibers.
- 30. The tube clamp of claim 25 wherein the filler material is formed from chopped fibers and polyimide resin.